

**REMARKS**

Claims 25-31 and 35-51 remain in this application.

Claims 26, 27, 29, 31, 37, 39-47, and 49 have been withdrawn from consideration. However most of these claims are dependent on generic claims which are allowable. Thus these claims should be reinstated and allowed along with the claims upon which they depend.

Claim 25 has been amended so as to recite that the grooves extend beyond every portion of the injection openings.

Regarding the Haeberer et al reference and the examiner's rejection of claims which is based on the Haeberer et al reference, it appears that the examiner has read the reference to Haeberer et al incorrectly. The examiner indicates that according to figures 4-6 and column 5 lines 3-47 of the US version of Haeberer et al, the grooves 55 shown in figure 3 extend beyond the injection openings.

However, contrary to the examiner's reading of Haeberer et al, the specification and disclosure of Haeberer et al is completely silent as to whether the embodiments of figures 4-6 include longitudinal grooves 55. Certainly column 5, the portion of Haeberer et al which the examiner appears to rely on for this teaching, never indicates anything about longitudinal grooves 55 being existent in the embodiments of figures 4-6. The only portion of Haeberer et al which has longitudinal grooves is figure 3 and its description. Figures 4-6 do not seem to have such longitudinal grooves as part of their disclosed embodiments.

Figure 4 of Haeberer et al does show an embodiment wherein the surface 32 extends partway across opening 11. It is assumed that this is the teaching which the examiner is

considering in his reading of the Haeberer et al reference. However, this teaching in Haeberer et al is not the same as the structure which is recited in claim 25, even before the changes to claim 25 which have been made in this amendment. Again, there is no teaching in Haeberer et al, contrary to the examiner's contention, of longitudinal grooves which extend into a region of the injection openings. Certainly not in figure 4, nor does Haeberer et al say anything, anywhere in their specification, of the figure 4 embodiment including grooves 55 which would extend from annular groove 35 to annular groove 42.

But even in spite of the shortcoming of the teachings of Haeberer et al as a reference against claim 25, claim 25 has now been even further amended so as to recite that the longitudinal grooves extend beyond every portion of the injection opening. Thus, even if somehow Haeberer et al could be read as teaching longitudinal grooves which extend as far as part of the injection openings, and it is applicant's contention that Haeberer et al cannot be so read, with this addition to claim 25 Haeberer et al even more clearly cannot be read on the structure recited in claim 25.

The examiner's rejection of claims based on the combination of the Haeberer et al and Schorr et al references also is not a tenable rejection. The grooves of Schorr et al are used for an entirely different purpose than are the grooves of applicant and Haeberer et al. The grooves of Schorr et al are used to accurately control the leakage of fuel from pressure chamber 19 towards the leak chamber. By means of these "leakage" controlling grooves of Schorr et al, the needle is hydraulically centered in portion 103 of bore 3. Thus the grooves of Schorr et al have nothing whatsoever to do with supplying fuel to injection openings. In view of this entirely

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different purpose for the grooves of Schorr et al, there is no reasonable interpretation whatsoever which would lead one skilled in the art to modify the grooves of Haeberer et al in view of the grooves of Schorr et al. The grooves of Schorr et al simply do not teach anything whatsoever about leading fuel into the injection openings, and certainly do not teach anything about what size such grooves should be to perform the function of leading fuel to the injection openings.

The fact that the leakage grooves of Schorr et al happen to have some of the same dimensions as applicants' is purely coincidental and has nothing more to do with applicants' invention than would grooves in a phonograph record if they happened to have the same dimensions.

The examiner has rejected claims 25, 28, 35, 36, 38, 48, 50 and 51 as being unpatentable over Haeberer et al in view of Schorr et al stating that the Haeberer et al reference shows grooves (55) but lacks the grooves being produced by a laser, having a width of 5 um to 50 um, and a depth from 1 to 10 times their width. The examiner then relies on the Schorr et al reference to overcome the features lacking in the Haeberer et al reference and to teach the width of the groove being a "results-effective variable." First, and especially since claim 25, on which these claims depend, has been modified such that the grooves are recited to extend to beyond every portion of the injection openings, clearly the Haeberer et al reference does not show or teach elongated grooves (55) which extend beyond the entirety of the injection openings as now recited in amended claim 25.

And certainly the reference to Schorr et al does not teach elongated grooves which extend beyond the entirety of the injection openings. The grooves of the Schorr et al reference are

positioned above the pressure chamber 19 and are used for centering the valve member 5. They have no relationship whatsoever to the function of the grooves of the Haeberer et al reference and thus cannot properly be used as a teaching to modify the grooves of the Haeberer et al reference.

The examiner may well be correct that Schorr et al say that the size of their grooves are a results-effective variable. But Schorr et al do not teach anything about the results of a groove which extends beyond the injection opening. Any results about which Schorr et al speak are results of centering the needle within the bore and leakage of fuel from pressure chamber 19 to a leakage area, and **not** to allowing fuel to enter the annular groove 25 and the injection opening.

Regarding claim 50, the grooves of Haeberer et al extend from the groove edge (39) to the first edge (46) of groove (42). By contrast, in applicant's Figure 5 and as recited in claim 50, the elongated grooves (38) have an end located inside the annular groove (25). Neither the Haeberer et al nor Schorr et al references show this. The elongated grooves shown in the application and as recited in claim 50 have their end which is away from the combustion chamber located within annular groove 25, and thus provide the advantage that the annular groove (25) is thus hydraulically connected to the recess (35) even when abrasion takes place between the valve needle and the valve seat. Neither Haeberer et al nor Schorr et al in any way show or teach such structure.

Furthermore, by ending in the annular grooves 25, such elongated grooves can be manufactured much easier, for example by a laser beam. The elongated grooves (38) are normally applied at the end of the production process. When the grooves are manufactured using a laser beam it is quite difficult to place the end of the groove precisely at the edge (29) as shown

in Figure 3. But it is much easier to extend the grooves to inside the annular groove (25). Using a laser beam also has the advantage that the grooves (38) can be manufactured after hardening of the conical faces (20, 22), which is not possible using a grinding or milling process. And moreover, while Schorr et al may provide grooves by a laser process, these grooves do not end within an annular groove as recited in claim 50. Plus, as stated above, the grooves of Schorr et al are provided for an entirely different purpose than are the grooves of applicant, and so it is apparent that the grooves of Schorr et al cannot properly be used to provide any teaching of how applicant's grooves, or the grooves of Haeberer et al should be made. The teachings of Schorr et al simply do not say anything about how or why the grooves of Haeberer et al should be modified. Since the grooves of Schorr et al are for an entirely different purpose, it is not at all appropriate to use them as a teaching of how or why the grooves of Haeberer et al should be modified.

For the grooves of Haeberer et al to be modified in an obvious fashion, there would have to be a teaching of modifying grooves which provide a flow of fuel to annular grooves such as grooves 35, 42 of Haeberer et al. **Schorr et al simply does not provide any such teaching.**

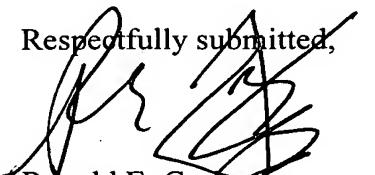
Contrary to claim 51, the grooves (55) of the Haeberer et al reference appear to be significantly deeper than the claimed microscopic grooves whose depth is less than 50 um as recited in claim 51. There is no teaching or proper rationale provided by either the Haeberer et al, and especially not by Schorr et al, to make the grooves of the Haeberer et al reference microscopic.

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Moreover, making these grooves microscopic allows for the use of a laser beam to generate them. As pointed out above, this achieves advantages which prior methods for providing these grooves cannot provide.

The Commissioner is authorized to charge a fee of \$120.00, for a first month extension of time as specified in the fee schedule for 2007, or any other necessary fees in connection with this communication, to Deposit Account Number 07-2100.

For the above reasons, entry of the amendment and allowance of the claims are courteously solicited.

Respectfully submitted,  
  
Ronald E. Greigg  
Attorney for Applicants  
Registration No. 31,517  
**CUSTOMER NO. 02119**

GREIGG & GREIGG, P.L.L.C.  
1423 Powhatan Street  
Suite One  
Alexandria, VA 22314  
Tel. (703) 838-5500  
Fax. (703) 838-5554

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